

IN THE CLAIMS

What is claimed is:

- 1 1. A method of forming a plurality of semiconductor device layers, comprising the  
2 steps of:  
3 forming an oxide layer by reacting hydrogen and oxygen on a surface  
4 of an insulating layer deposited over a wafer; and  
5 forming a conductive gate layer over the oxide layer.

- 2 2. The method of claim 1, wherein:  
3 the reacting of hydrogen and oxygen is performed at a wafer  
4 temperature in the range of about 800°C to 1300°C.

- 1 3. The method of claim 1, wherein:  
2 the oxide layer has a thickness in the range of 20-60 angstroms.

- 1 4. The method of claim 1, wherein:  
2 the reacting of hydrogen and oxygen on the wafer surface has a  
3 duration in the range of 30 seconds to 2 minutes.

- 1 5. The method of claim 4, wherein:  
2 the reacting of hydrogen and oxygen on the wafer surface has a  
3 duration in the range of approximately 1 minute.

- 1   **6.**     The method of claim 1, wherein:  
2             the conductive gate material includes polysilicon.
  
- 1   **7.**     The method of claim 1 wherein:  
2             the oxide layer and conductive gate layer form a SONOS-type device.
  
- 1   **8.**     The method of claim 1 wherein steps prior to forming the oxide layer comprise:  
2             forming a tunnel dielectric; and  
3             depositing the insulating layer, the insulating layer being a charge  
4             storing dielectric layer.
  
- 1   **9.**     The method of claim 8 wherein:  
2             the charge storing dielectric layer includes silicon nitride.
  
- 1   **10.**    The method of claim 1, further including:  
2             forming a gate etch mask; and  
3             etching to form gate stacks; and  
4             forming insulating sidewalls on the gate stacks.
  
- 1   **11.**    The method of claim 8, wherein:  
2             forming the tunnel dielectric, forming the charge storing dielectric  
3             layer, and forming the oxide layer occur in a single wafer processing tool.

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1   **12.**   A method, comprising the steps of:  
2               forming a bottom dielectric on a substrate surface;  
3               forming a middle dielectric over the bottom dielectric; and  
4               forming a top dielectric over the middle dielectric by heating the  
5               substrate to less than about 1200 °C for less than two minutes.

1   **13.**   The method of claim 12, wherein:  
2               forming the top dielectric further includes reacting the surface of the  
3               middle dielectric layer with hydrogen and oxygen.

1   **14.**   The method of claim 12 wherein:  
2               the middle dielectric comprises at least one layer selected from the  
3               group consisting of silicon nitride, silicon oxynitride, and silicon rich silicon  
4               nitride.

1   **15.**   The method of claim 12 wherein:  
2               the bottom dielectric has a thickness of less than 15 angstroms; and  
3               the top dielectric has a thickness of less than 50 angstroms.

1   **16.**   A method of manufacturing a SONOS-type device, comprising the steps of:  
 2               oxidizing a charge storing dielectric comprising at least one layer that  
 3               includes silicon and nitrogen by reacting hydrogen and oxygen to form a top  
 4               oxide layer over the charge storing dielectric.

1   **17.**   The method of claim 16, wherein:  
 2               the oxidizing lasts for less than two minutes.

1   **18.**   The method of claim 16, wherein:  
 2               the oxidizing occurs at a temperature of less than 1200 °C.

1   **19.**   The method of claim 16, further including:  
 2               a tunnel dielectric formed below the charge storing dielectric;  
 3               forming a conductive gate layer over the top oxide layer; and  
 4               patterning at least the top oxide and charge storing dielectric to form a  
 5               gate stack.

1   **20.**   The method of claim 16, wherein:  
 2               the top dielectric has a thickness greater than 20 angstroms.